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DAIRY FARMING for BEGINNERS



PRACTICALLY ALL the dairy products consumed in the United States are supplied by approximately 25,000,000 cows on the farms in this country. Many of these are cows that do not have good dairy breeding. The estimated average yearly production per cow in the United States during 1934 was 4,030 pounds of milk and 158 pounds of butterfat. The average production of the cows on test in dairy-herd-improvement associations that completed yearly records in 1934 was 8,015 pounds of milk and 322 pounds of butterfat. This is twice as much as the average milk cow produced. However, these cows represented less than 2 per cent of the total number. Any increase in demand for dairy products due to growth in human population or to a larger consumption of dairy products per person should be met, not by more dairy cows, but by an increased production of milk and butterfat per cow.

The total number of dairy cows varies a little from time to time. Changes are constantly taking place in dairy farming in different sections. There is an expansion in some sections and a reduction in others. Dairy herds are increased or reduced in size as conditions warrant. Established herds are sold and new ones formed. Beginners take up the work where old hands leave off. As a result there is a need for information concerning the important points for the beginner in dairying to consider. This bulletin is intended to meet that need.

DAIRY FARMING FOR BEGINNERS

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"SHALL I GO into dairy farming?" is a question many persons are asking themselves. Whether or not a man decides to make dairying his life work or to change from his present occupation to this business depends on the answers he makes to such questions as: Will I find dairy farming profitable? Will it pay well enough to justify making a change from my present occupation? Will I enjoy the work? Am I fitted for this type of farming? Would my present or my prospective location prove adaptable for efficient and economic production of dairy products? Is there a suitable market and a good demand for these products?

This bulletin attempts to present the factors which the prospective dairyman should consider in his efforts to answer these questions.

Dairy farming as a business has many features to commend it.

It is a year-around business. It furnishes a steady labor market at all seasons.

Cash receipts are regular and frequent, providing for current expenses, for financing farm operations, and for systematic saving.

High-producing dairy cows furnish a home market and large returns for hay, grain, silage, soiling crops, and root crops.

The manure, if properly preserved and applied to the land, aids in maintaining the fertility of the soil.

Many farmers favorably situated, therefore, will find the business a profitable one.

Dairy farming, however, is exacting in its requirements, and intelligent planning and well-directed efforts are necessary to make it a success.

It requires a liking for dairy cattle, the ability to give proper attention to details, a willingness to work long hours, and a temperament that is not easily discouraged. A larger investment for buildings is necessary than with some other types of farming.

The fact that dairying is a 365-day-a-year occupation often renders it irksome. The dairyman has no holidays and vacations except when he is able to obtain a competent substitute.

In summer, dairying and crop raising conflict. The dairyman must feed and milk his cows, care for his equipment, and handle his products every day. Cropping and general farming operations must proceed much as on other farms. This makes for long hours in the day's work. It is sometimes difficult to obtain competent help at this time, although the dairy farmer has some advantages in hiring help, because he can offer a year-around job.

Any person contemplating going into dairying will do well to study it from all angles in order to determine whether or not it will be a practical and profitable business for him to undertake.

The prospective dairyman must consider other factors in connection with dairy farming. The first of these are a satisfactory market, the adaptability of the farm for dairying, and capital for dairy buildings, equipment, and the dairy herd. Next come problems incident to the planning, construction, and equipment of buildings, growing of feed crops, and selection of the foundation herd. When the dairyman has established his herd on the farm he faces many problems of dairy-herd management.

A SATISFACTORY MARKET

There must be an established market for dairy products or positive assurance that such a market will be established by the time it is needed. The principal markets are wholesale and retail market milk, creameries, cheese factories, and condenseries. In some localities ice-cream factories furnish a market for limited quantities of whole milk and sweet cream.

MARKET MILK

Where the dairyman can take advantage of them, retail milk routes and city milk-distributing plants to which market milk is sold wholesale usually furnish the best-paying markets. Usually he will obtain twice as much for his milk by retailing it as by selling it wholesale. He must, however, deduct the expense for equipment, supplies, and labor for pasteurizing, cooling, bottling, storing, and delivering the milk. The net profits, therefore, may not be so great as in selling milk wholesale. Before retailing or selling milk wholesale to a distributor consult the local health officer or board of health concerning the regulations regarding dairy barns, milk houses, manure disposal, and the handling of dairy products.

CREAMERIES, CHEESE FACTORIES, AND CONDENSERIES

Everything considered, there is on an average little difference in the net returns from marketing dairy products through creameries, cheese factories, or condenseries. Condenseries and cheese factories can use only sweet whole milk, necessitating delivery at least once a day, and in many places twice a day for a part of the summer. By selling his product to the creamery the dairyman greatly reduces the bulk and weight to be delivered and also the number of trips to be made where he has facilities for holding the cream at a low

temperature. The cost of hauling, therefore, is greater for the condensery and cheese factory than for the creamery.

The condensery usually pays more than does the creamery or the cheese factory, but the difference may be partially or wholly offset by the feeding value of the skim milk retained when cream is sold to the creamery, or that of whey returned when milk is sold to the cheese factory. The whey is usually available if the farmer wishes to haul it away from the factory. In each 100 pounds of whole milk there is approximately 85 pounds of skim milk or whey.

In many sections farmers sell their milk and cream through co-operative creameries, cheese factories, or condenseries, which they own or control, or through a cooperative marketing association. By pooling their output and marketing it cooperatively, a group of farmers who produce and control a large volume of milk are more often able to negotiate for a satisfactory market than is the individual producer.

The dairyman can determine the relative returns under different marketing methods by comparing the prices paid to local farmers by dairy concerns in his section, and adding thereto the value of any skim milk or whey fed on his farm.

FEEDING VALUE OF SKIM MILK AND WHEY

Skim milk contains practically all the nutrients of whole milk except the butterfat. It is an excellent feed for growing calves, pigs, and chicks, for fattening pigs and poultry, and for feeding laying hens.

The cash value of a given quantity of skim milk or whey, fed in properly balanced rations, is equal to the cash value of the quantity of any other feed that has the same feeding value. In feeding calves, approximately 10 pounds of dry skim milk or 10 to 12 pounds of commercial or home-mixed calf meals are equal to 100 pounds of fluid skim milk. In pork production the feeding value of 100 pounds of skim milk is equal to that of 11 pounds of corn and 7 pounds of tannage. For laying hens, 100 pounds of skim milk are equal to 15 to 20 pounds of meat scrap. Only sweet skim milk should be fed to calves, but either sweet or sour skim milk is suitable for hogs and poultry.

Whey lacks not only the butterfat but most of the proteins of whole milk; it is fed largely to hogs and only to a limited extent to calves and poultry. Its value in pork production is only about half that of skim milk. It should not be fed alone to calves; adding some milk gives better results. Experiments in Denmark indicate that 100 pounds of whey plus 25 pounds of skim milk produce approximately the same body weight in calves as do 100 pounds of skim milk. Whey is useful in moistening poultry mash, although its value as a poultry feed is considerably less than that of skim milk. It should be pasteurized at the cheese factory, placed in clean cans, and fed while still fresh and wholesome.

ADAPTABILITY OF THE FARM FOR DAIRYING

The dairy farm should be fertile, large enough to permit growing both feed and cash crops, located conveniently to dairy markets, and abundantly supplied with pure water.

Dairy cows require large quantities of feed. Fertile soil makes it possible to produce these at a low cost. A sufficient acreage in good pasture reduces the quantities of other feeds required and lowers the cost of the ration by allowing the cow to harvest a part of her own feed. The prospective dairyman should estimate carefully the crop-producing capacity of the farm so that he will not make plans for too large a herd. Unless a special dairy market is available it is usually advisable to add to the farm income by growing some cash crop that is especially suited to the section in which the farm is located.

To make it possible to deliver dairy products easily and economically, the farm should be located on a good road close to town or to a shipping point or on a milk or cream collecting route.



FIGURE 1.—Good type farm milk house

CAPITAL FOR THE DAIRY ENTERPRISE

Many dairymen have failed financially because of a lack of sufficient capital, the too liberal use of credit, or the unwise expenditure of money in the management of the enterprise. Provide adequate buildings and equipment and a suitable foundation herd at a minimum of expense. If cash funds are limited, do not employ credit too extensively. It is always better to begin with a small herd than to go too deeply into debt.

PLANNING, CONSTRUCTION, AND EQUIPMENT OF BUILDINGS

The buildings usually required are a dairy barn, milk house, silo, manure pit, and an ice house in regions where natural ice can be harvested. The bull and young stock are often housed in a separate shed or barn.

Some dairymen house their cows in a 1-story barn and keep the feed in a separate building. A silo is desirable to provide succulent

feed during the winter and during the summer when pastures are short and dry. A manure pit is needed to preserve the manure, so that there will be little loss in fertilizing value before it can be spread on the land. Every dairy farm should have a milk house, (fig. 1), in which to care for the dairy utensils and to cool the milk or cream quickly after milking and keep them cool in a storage tank of ice water or cold running water until delivered. The milk house should be sanitary but need not be expensively constructed.

Plan the construction and arrangement of the buildings before starting work on them. In planning the arrangement, consider present needs and future expansion. Proper sanitation and adequate light and ventilation are all important and play a part in the health of the herd and the production of clean milk.

The type and cost of suitable dairy buildings depend upon climate, cost of materials, labor, and other conditions as they exist on each farm. In cold climates, deeper foundations and warmer and therefore more expensive buildings are required than in warm climates.

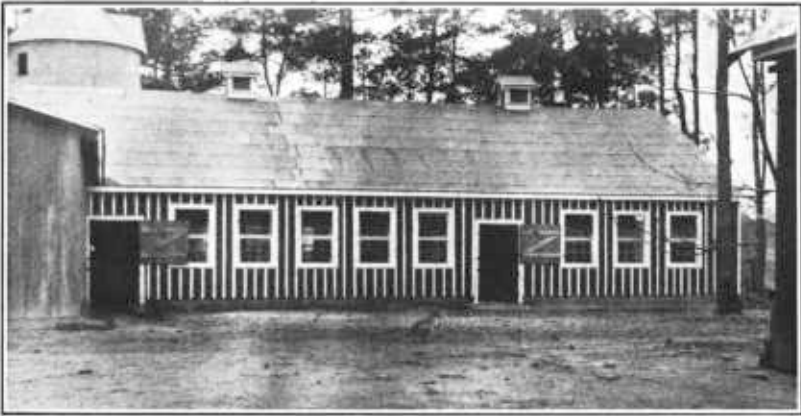


FIGURE 2.—Practical one-story dairy barn suitable for a warm or moderate climate

(Fig. 2.) On some farms the dairymen can provide buildings by remodeling other buildings. (Fig. 3.)

Dairy barns and milk houses should be adequately and economically equipped. The equipment should be durable, easy to keep clean, and suited to the purposes for which it is to be used. It should provide for the comfort and health of the animals, convenience in performing the work, and clean milk production, essentials of which are well-sterilized utensils, clean cows, and properly cooled milk held in storage. Careful methods of production have by far the greatest influence on the quality of the product.

GROWING FEED CROPS

In most cases home-grown feeds are cheapest and best. Plan a large enough acreage to provide sufficient pasture, silage, hay, and grains. Purchase only the high-protein mill feeds required to balance the home-grown grains. An abundant supply of good cheap feed is important for the economical production of milk and butterfat. (Figs. 4 and 5.) Crops suitable for dairy cattle are grasses

and some of the legumes for pasture; corn, the sorghums, milo, kafir, corn and soy beans, peas and oats, and other mixtures for silage; legumes or a mixture of a legume and a nonlegume for hay; and soy beans, oats, corn, barley, kafir, and miscellaneous small grains for concentrates. Select the crops and the best varieties of these crops adapted to the locality. Plan a regular rotation of the crops that will aid in building up the fertility of the soil and that will supply the quantities of these feeds needed.

The quantity of feed required for each cow varies with her size and production. As a general rule, the average-sized cow that is on pasture during the summer will require about $2\frac{1}{2}$ tons of hay or $1\frac{1}{2}$ tons of hay and 3 tons of silage yearly. High-producing cows require from 1 to 2 tons of grain, or even more per year, according to their production. The yearling heifer requires small quantities of

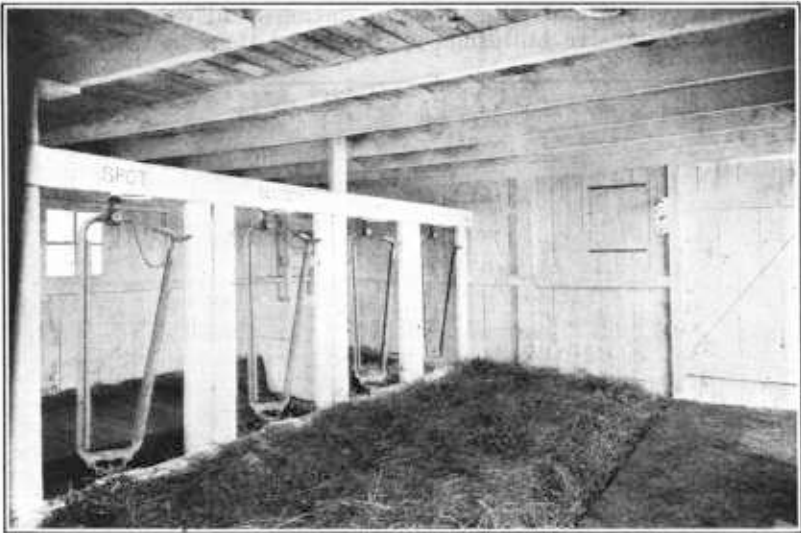


FIGURE 3.—Some farm barns can be transformed into satisfactory dairy barns at small expense

grain and about one-half as much pasture and roughage feeds as a mature cow. It is always a good plan to provide a little surplus of roughage feeds. Any feed not consumed can be carried over to the next season.

SELECTION OF THE FOUNDATION HERD

There are several dairy breeds in the United States, all of which are giving satisfaction. Before deciding which breed to buy, consider such factors as the breed predominating in the locality, personal preference, and market requirements for dairy products. Good cows and poor cows are found in all breeds. The selection of the individual cow is more important than the selection of the breed. Do not cross breeds as the characteristics of both will be so mixed in the offspring that they will not be passed down to future generations with any degree of certainty.

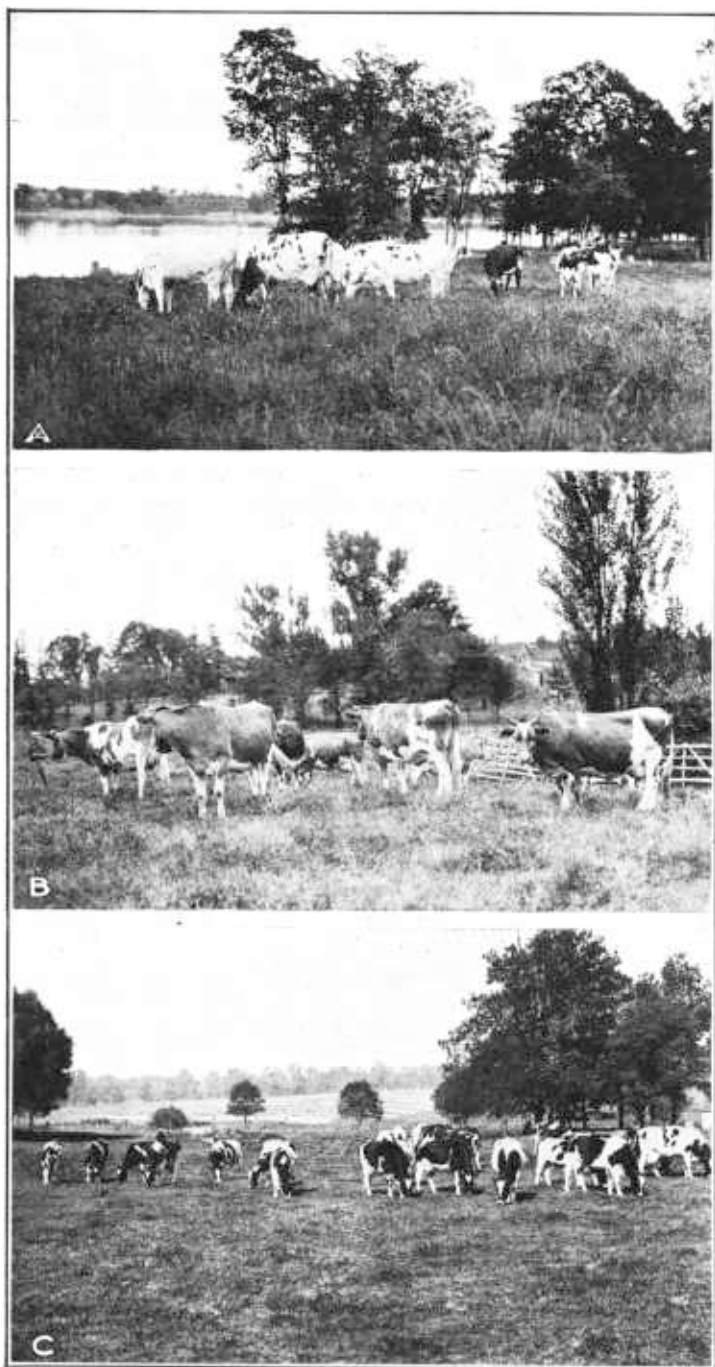


FIGURE 4.—Good pastures cut down feed and labor costs: A, Ayrshires; B, Guernseys; C, Holsteins

The importance of selecting healthy animals can not be overemphasized. It is easier and cheaper to buy such animals than to get rid of diseases, once they have gained a foothold in the herd. Purchase only guaranteed breeders, which are subject to physical inspections as to general health and to approved tests for tuberculosis

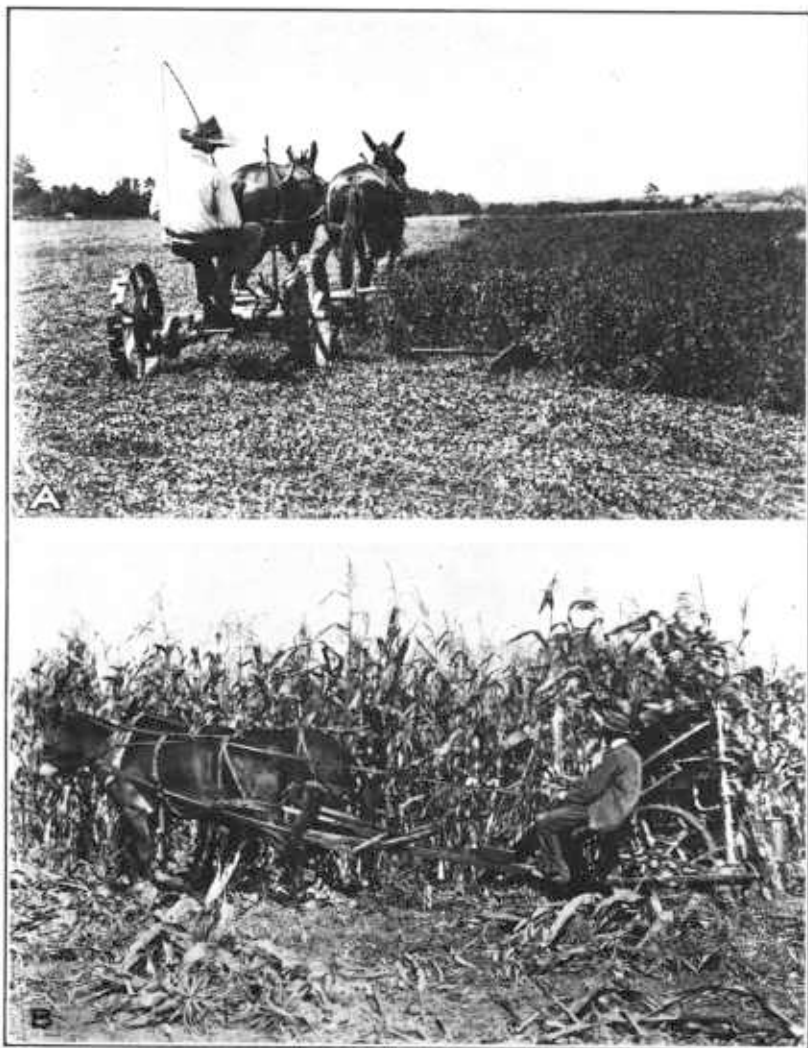


FIGURE 5.—An abundance of home-grown feeds makes economical production possible ;
A, Cutting alfalfa for hay ; B, Harvesting corn for silage

and infectious abortion. In shipping animals from one State to another, comply with the regulations of the State livestock sanitary boards with regard to health certificates and shipping rules.

THE FEMALES

Regardless of the breed chosen, the best practice for the beginner with little experience is to start with a small herd of young, healthy,

grade cows of good conformation and producing ability. Avoid buying shy breeders or cows with injured or diseased udders. Purebred females may be purchased from time to time as finances permit. By raising healthy, well-grown heifers that have an inheritance for a high level of milk and butterfat production, the necessity of culling poor cows because of low production will be eliminated, and in the course of time a good herd will be established at low cost.

If the dairyman has had considerable experience and commands a sufficient working capital, it may be advantageous for him to include a large percentage of purebred females in his foundation herd, especially if he intends to make a business of selling purebred stock for breeding purposes. The initial cost of purebreds will be higher than that of grades and therefore the risk will be greater, and the care and management will require more knowledge and skill.

The age at which foundation females should be purchased depends upon the needs of the individual farmer. Bred heifers usually cost less than older cows. Cows 3 to 5 years old that are known to be good producers and regular breeders and have sound udders will give larger immediate returns than either old cows or bred heifers. Old cows should not ordinarily be purchased unless they are especially valuable as breeding stock and can be obtained at a comparatively low price.

The dairyman usually can purchase cows capable of high production or well-bred young stock in the older dairy sections and also from well-established dairymen in other sections. He can not select such cows with certainty on the basis of general appearance alone. Actual milk and butterfat records made under normal conditions are the best indication of the cow's ability to produce. Fortunately, a large number of cows in the United States are being tested for production on a yearly basis. Dairy-herd-improvement-association records show the yearly production of milk and butterfat, cost of roughage, cost of grain, gross income, and average income over cost of feed for each cow in the herd. These records are kept by impartial testers and serve as an excellent guide in the selection of foundation stock. In addition, production records are being kept on many purebred herds by the herd-test plan and by advanced registry and register-of-merit tests.

THE BULL

From the standpoint of herd improvement the bull is the most important member of the dairy herd. His influence on the calf crop is as great as that of all the cows combined. This influence will be good or bad, according to whether he transmits high or low production to his offspring. He must, therefore, be selected with great care.

In the first place the bull should be registered. He should be a well-grown individual as shown by his size and vigor, and he should be so bred that it can be expected that he will possess an inheritance that will enable him to sire daughters with an ability for a high level of milk and butterfat production. Unless the inheritance of the herd for production is improved there will always be a considerable number of low producers to be culled from the herd. It is usually costly to raise these low producers to the age where their producing capacity can be determined.

The ability of a bull to sire such daughters can be determined only after he has a sufficient number of daughters with records that can

be compared with the records of their dams. The best bull to buy, therefore, is a mature bull of proved ability. (Fig. 6.) Unfortunately, the number of such bulls that have been proved in this way is limited, and they are often either not available or are prohibitive in price. Until such time as bulls are proved in large numbers, most breeders must of necessity select unproved bulls.

When a young bull is selected he should be a son of a sire whose transmitting ability for production is known to be good. His dam should be a good producer and preferably a daughter of a good proved sire. The better the cows in the herd, the better the herd sire must be if the production of the future herd is to be maintained or increased.

Most farmers do not like to keep bulls after they reach maturity because of a possibility of their becoming dangerous. Older bulls

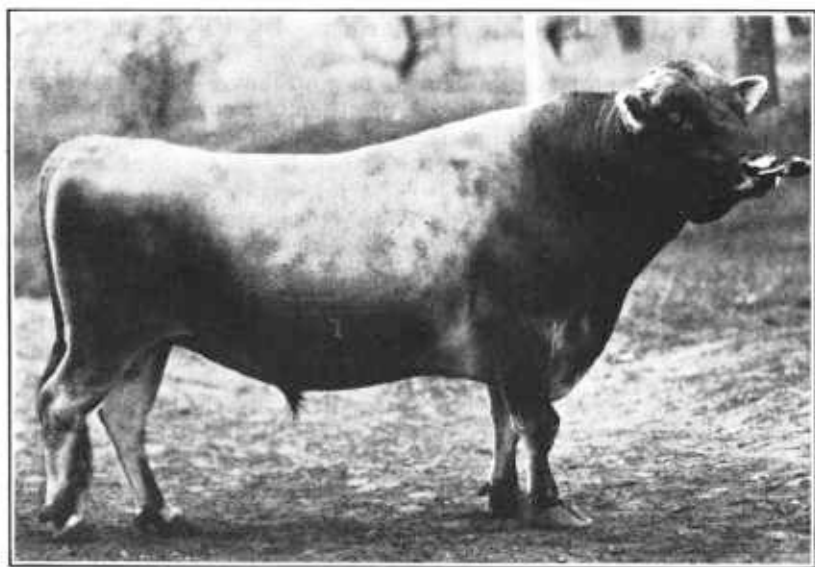


FIGURE 6.—A purebred sire of proved ability whose daughters averaged considerably higher in production than their dams

can be managed without danger, however, if the right kind of quarters and breeding pen are provided. Keep the bull in service in your own or another herd until his daughters have completed a lactation period and his transmitting ability has been thereby determined. Many of our best sires have been killed before their transmitting ability was known. These sires might have been kept in service many years longer. Had this been done the herds in which they were used and the breed as a whole would have benefited correspondingly. Prove your sire before he is slaughtered.

In sections where herds are small and there is a concerted movement toward the establishment and improvement of dairy herds, the services of good bulls may be obtained at the lowest cost by means of a cooperative bull association. This is a farmers' organization formed for the purpose of joint ownership, use, and exchange of high-class purebred dairy bulls. The members are divided into three or more groups of neighboring farmers, each group being known as

a block. A block may consist of one herd or several herds and contain from 50 to 75 cows. One bull is assigned to each block. In order to prevent inbreeding, each bull is moved to another block every two years. If all the bulls live and are kept until each has made one complete circuit, no new bulls need to be purchased for six or more years, or as long as these bulls continue to be serviceable. During this time each member will have had the use of a high-class purebred bull. You can obtain further information concerning the cooperative bull association from your State agricultural college or from the Bureau of Dairy Industry, United States Department of Agriculture, Washington, D. C.

DAIRY-HERD MANAGEMENT

KEEPING HERD RECORDS

To obtain accurate and detailed information concerning your herd keep herd records. The system of keeping records need not be elabo-



FIGURE 7.—Weighing and recording milk. The case contains samples of each cow's milk to be tested for percentage of butterfat

rate but should be complete enough to furnish accurate information on the production of individual animals, quantity and kinds of feed eaten, and breeding data. These records are an aid in feeding cows according to known production, detecting sickness or any abnormal condition, culling out low-producing cows, building up the future herd through the selection of heifers out of high-producing cows, and determining the ability of the herd bulls to sire daughters of merit. Herd-record books, milk sheets, and other blank forms necessary for keeping such records can be procured for a small sum.

Production records are obtained by weighing each cow's milk daily, testing her milk at regular intervals for percentage of butterfat, and calculating the quantity of butterfat produced. (Fig. 7.) Feed records are obtained by weighing the quantities of feed consumed. The grain should be weighed at each feeding. The hay and silage need be weighed only occasionally.

Dairymen themselves may keep feed and production records of their cows, or they may join a dairy-herd-improvement association and have this work done by the association tester. Thousands of farmers have found the latter a cheap and reliable method for keeping such records. The national dairy-cattle breed associations, in cooperation with the State agricultural colleges, maintain systems of official and semiofficial testing for purebred dairy cows; and some have adopted plans for herd testing whereby yearly records of entire purebred herds may be more cheaply obtained. Write to the agricultural college in your State for information regarding the organization and operation of dairy-herd-improvement associations and the rules and requirements for official testing and the herd-testing plan.

Calving records enable the dairyman to breed the cow at the proper time. It is good dairy management to breed each cow so that she will freshen once every 12 months. This allows for a 10 or 11 month milking period and a 1 or 2 month dry period. On the day that the cow is bred a record should be made of the date of breeding, the name of the bull to which she is bred, and the probable date of calving. Breeding records eliminate guesswork as to calving date and permit the dairyman to dry up the cow a reasonable length of time before she is due to freshen. Such records also indicate the extent of any breeding difficulties that may arise.

Follow a plan of identification and the registration of purebred animals. Proper methods of identification eliminate guesswork regarding the identity of the members of the herd. Assign a number to each animal in the herd and to each newborn calf. These numbers are attached to the animal by means of stamped metal tags attached directly to the ear; stamped metal or fiber disks fastened with hog rings to the upper part of the ear; or by means of stamped metal tags attached to a leather strap placed around the animal's neck. Tattooing numbers and letters in the ear is practiced by some breeders and is required by some breed associations in connection with registration and official testing.

Register all purebred young stock promptly. The national dairy-cattle breed associations furnish directions and advice for registering purebred cattle. The names and addresses of these associations are as follows:

American Guernsey Cattle Club, Peterboro, N. H.

American Jersey Cattle Club, 324 West Twenty-third Street, New York City.

Ayrshire Breeders Association, Brandon, Vt.

Brown Swiss Cattle Breeders Association, Beloit, Wis.

Holstein-Friesian Association of America, Brattleboro, Vt.

COST OF KEEPING THE DAIRY COW

Studies made by the Bureau of Dairy Industry on the unit cost of producing market milk in different sections of the United States showed that on an average the cost of feed, including pasture, was about 50 to 55 per cent of the total cost. The cost of labor averaged about 20 per cent of the total. The remaining 25 to 30 per cent of the total expense was for the following: Dairy supplies, charges for the use of dairy buildings and equipment, interest on the investment in the dairy herd, livestock taxes and insurance, veterinary services, medicines, disinfectants, dairy-herd-improvement-association costs, and depreciation in the value of the animals in the herd.

because of old age, disease, and accidents. The value of the calves and the manure for fertilizer, on the other hand, was equal to 15 to 25 per cent of the cost of keeping the dairy herd. The total cost of keeping a dairy cow, as well as the different items of expense, however, varies considerably in different sections of the United States and under different conditions of feeding and management.

The average productive life of a cow is from five to seven years. A sufficient number of heifer calves of good breeding should be raised for replacement purposes.

Although the expense of keeping the herd should be kept as low as possible, the saving of a little money in some instances may result in the loss of large sums. For example, there is no economy in saving feed by underfeeding good dairy cows, for such cows will return a larger profit if liberally fed according to known production than if considerably underfed. As another example the value of the information obtained concerning the herd will more than repay the dairyman for the small cost of joining a dairy-herd-improvement association. The records will show, for instance, which are the low producers. By culling these from the herd the dairymen will be able to save the feed which they would have consumed.

LABOR REQUIREMENTS

Due to the conditions existing on each farm, there is a wide variation in the amount of man labor required to handle a dairy herd. In a study of the cost of milk production on 48 Wisconsin farms made jointly by the Bureau of Agricultural Economics, United States Department of Agriculture, and the University of Wisconsin, it was found that the amount of man labor averaged 171 hours per cow for the year, or 28 minutes per day. This labor included milking, feeding, caring for utensils, and cleaning the barn. It did not include hauling manure from the barn, delivery of milk, or caring for young stock. On some of the farms the time spent was as little as 20 minutes per cow per day and on other farms it was as much as 45 minutes. Producing milk of high quality requires very little more labor than producing milk of medium or low quality. Large herds require less labor per cow than do small herds. A convenient arrangement of barns and milk houses; the use of equipment, such as feed and litter carriers, power-operated cream separators, and milking machines; and the employment of efficient labor all help to cut labor requirements to a minimum.

STORIES DAIRY-HERD-IMPROVEMENT-ASSOCIATION RECORDS TELL

The production and feed records of dairy-herd-improvement associations contain a wealth of information relative to feeding and management practices. The Bureau of Dairy Industry has made a study of these records on a large scale. Many of the facts ascertained are of vital importance to the dairyman, especially to the beginner. A few of the studies made are discussed here in a brief way.

The purebred dairy cows of this country produce more milk and butterfat than do grade cows when both are kept under similar conditions. Studies of over 100,000 yearly individual-cow records show that the average purebred cow produced 10.6 per cent more milk, 6.7 per cent more butterfat, and returned 9.7 per cent more yearly income over feed cost than did the average grade cow.

Studies of over 100,000 yearly individual-cow records show that the highest-producing cows are the most profitable. As production increased the value of product, total feed cost, and the value of product over feed cost increased, whereas feed cost per pound of butterfat decreased. (Table 1.) These figures show that the increased production more than offsets the extra feed cost and indicate that it pays to feed good cows liberally according to known production.

TABLE 1.—*Relation between butterfat production and other factors*

Production of butterfat (pounds)	Value of product	Cost of feed	Income over cost of feed	Cost of feed per pound of butterfat
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
106	49.61	37.91	11.70	0.36
203	92.25	49.07	43.18	.24
300	135.42	59.31	76.11	.20
397	177.00	67.89	109.11	.17
496	224.78	78.12	146.66	.16
596	268.32	88.98	179.34	.15
696	350.04	107.22	242.82	.15

A study was made to show the influence of 500 purebred dairy bulls when mated with cows in dairy-herd-improvement associations. Each of these bulls had five or more daughters, whose records were compared with those of the dams of the daughters. It was found that on an average the daughters produced 5.3 per cent more milk and 11.8 per cent more butterfat than their dams. A study of these records also showed that, although most purebred bulls are able to increase the production of daughters over poor and medium producing dams, only the best purebred bulls can be relied on to increase the production of daughters over high-producing dams.

The time of year that a cow freshens has an influence upon the production of milk and butterfat, amount and cost of feed consumed, and income over feed cost. As a rule, cows freshening in the fall and early winter produce more and yield a larger income over cost of feed than cows freshening at other times of the year. A cow that is dry too much of the time does not produce as much and is not as profitable as she would be if she were dry only long enough to prepare for the coming lactation period.

WHERE TO OBTAIN INFORMATION ON DAIRYING

Information on dairying may be obtained from your county agricultural agent, State agricultural college, and the Bureau of Dairy Industry, United States Department of Agriculture, at Washington, D. C. This information is available in the form of bulletins and circulars covering different phases of dairying. The Bureau of Dairy Industry and many of the State agricultural colleges also have available plans for dairy barns, milk houses, etc.

There are many excellent dairy textbooks that are valuable for study and reference and several good dairy-farm journals and dairy-breed journals that discuss topics of interest to the dairyman. A list of these and the names of the publishers will be furnished by the Bureau of Dairy Industry to those who desire them.